

The author next investigates the acoustic relations between the actions of the glottis and that of the vocal pipe, and the acoustic effects of flexible membranous tubes on a column of air vibrating within it, and finds that the structure of the trachea and of the soft parts above and below the larynx is adapted to vibrate synchronously with any note that may be formed in the larynx. The falsetto voice may be produced either by the partial closing of the glottis, or by a nodal division of the vocal chords; the pitch of the sound in the production of this peculiar modification of the voice, being such that the column of air in the vocal tube is of the precise length requisite to vibrate in unison with the larynx. The inquiry is further extended to the sources of the various tones of the voice in singing, such as the *bass*, *tenor*, *contralto*, and *soprano*; together with their subdivisions of *barytone*, *mezzo-soprano*, and *soprano-sfogato*; and to the places which they occupy in the musical scale. Independently of the falsetto, the compass of the natural voice rarely exceeds two octaves; although in some cases, as in those of Malibran and Catalani, it may extend even beyond three. The voice in singing is modulated by the contraction or relaxation of the velum, uvula and fauces. The author lastly adverts to the attempts that have, at various times, been made by the Abbé Mical, Faber, Kratzenstein, De Kempelin, Willis, Wheatstone and others, to imitate articulate sounds by mechanism.

Having thus examined the human voice as resulting from the vibration of membranous ligaments, in obedience, first, to the laws of musical strings; secondly, to those of reeded instruments; and thirdly, to those of membranous pipes; he arrives at the conclusion, that the vocal organs combine, in reality, the actions of each of these instruments, and exhibit in conjunction, the perfect type of every one of them.

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June 18, 1846.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

“The Electric Fluid.” By W. F. Stevenson, Esq., F.R.S.

The author denies the existence of two electric fluids, and maintains that all the phenomena are explicable on the hypothesis of a single fluid; which when present in a conducting body renders it positive, and in a non-conducting body, negative; but a body which is naturally a conductor, may, he asserts, be rendered otherwise, by changing its form.

“Observations of the Heights of the Thermometer and Barometer made at Lenham Lodge, near Maidstone, Kent, during the first nine days of the month of June 1846.” By George Hunsley Fielding, M.D., F.R.S.

On Sunday the 7th of June 1846, the thermometer in the shade rose to the extraordinary height of 94° Fahr., exceeding by one de-

gree the heat of the 13th of July 1808, which was considered to be the highest on record in this country.

“On the relative dynamic value of the Degrees of the Compass; and on the Cause of the Needle resting in the Magnetic Meridian.” By Sir Graves C. Haughton, K.H., M.A., F.R.S., Foreign Associate of the Institute of France.

By ascertaining the distances at different azimuths at which a bar magnet placed with its axis directed to the centre of a magnetic compass needle caused the needle to assume the position in which its axis was in the same line with that of the magnet, the author found that these points of distance form a peculiar curve, which was nearest to the centre of the magnet at the east and west azimuths, and receded from it as it advanced to the north and south; and was twice the distance from it at the north than at the south azimuths. From this and other experiments he infers that the value of every degree of the compass is inversely as the square of the length of the ordinate or co-ordinate passing through it, the abscissa being considered as zero; and that the magnetic needle does not rest in the magnetic meridian in consequence of polar attraction, but is impelled in that direction by the effect of repulsion, from the east or west, and that its natural position is the result of an equilibrium between the eastern and western repulsions. On the other hand, the return of the needle, when it is placed in the reverse position, that is, when made to deviate  $180^\circ$  from its natural position, is the result of an attraction towards the east and west positions; the force of attraction in that case being quadruple the force of repulsion in the former case. He is consequently led to the conclusion that the operation of terrestrial magnetism is totally different from that of an artificial magnet, in which latter case the attractive and repulsive forces are exactly equal.

“Remarks on the Extractive Material of Urine, and on the Excretion of Sulphur and Phosphorus by the Kidneys in an unoxidized state.” By Edmund Ronalds, Ph.D., Giessen. Communicated by Golding Bird, M.D., F.R.S.

In the course of an experimental inquiry in which the author was engaged with a view to ascertain whether larger quantities of carbon were discharged by the kidneys in cases in which the functions of the lungs or liver were imperfectly performed, he was led to the result, that sulphur, not combined with oxygen in the form of sulphuric acid, existed in the urine to the amount of from three to five grains in the course of a day; and also that phosphorus, not in the state of phosphate, was in the same period excreted by the same channel, to the extent of nearly six grains.

“On some peculiarities of Fœtal Digestion.” By George Robinson, M.D. Communicated by William Bowman, Esq., F.R.S.

The author endeavours to show, contrary to the assertions of Dr. Robert Lee, that the human fœtus, in common with that of all the